Biology GCSE Revision

Topic 7

Ecology

Booklet 2 of 3

- Adaptations
- Sampling Methods

Mark Scheme

BL1HP

Question 3

question	information			mark
3	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 2, and apply a 'best-fit' approach to the marking.			6
0 marks	**Level 1 (1-2 marks)**	**Level 2 (3-4 marks)**	**Level 3 (5-6 marks)**	
No relevant content.	There is at least one example of an adaptation of either an animal **or** a plant. However it may not be clear how the adaptation helps the organism to avoid being eaten.	There is a description of an adaptation of at least one animal **and** at least one plant. It is clear how at least one of these adaptations helps the organism to avoid being eaten.	There are clear and detailed descriptions of a range of adaptations of named animals **and** named plants. It is clear how most of these adaptations help the organisms to avoid being eaten.	

examples of clear and detailed biology points made in response:

- **camouflage** – the method of camouflage should be described plus a statement that the predator is less likely to see the prey
- **mimicry / warning colouration** – the method should be described plus a statement that the predator is likely to confuse the prey with e.g. a poisonous organism
- **thorns / prickles / spines / horns** – a statement that these are sharp and are likely to hurt a predator
- **long limbs / streamlining** – a statement that these increase speed and make it more likely that prey will outrun predator
- **bad taste / poison** – a statement that predator will find this unpleasant and 'spit out' prey / not attack same prey again
- **large ears / position of eyes** – a statement that predators will be detected earlier so the prey can escape sooner

Total		6

BL1HP

Question 5

question	answers	extra information	mark
5(a)	extremophile(s)		1
5(b)(i)	common (periwinkle) and flat (periwinkle)	either order, **both** required	1
5(b)(ii)	(common and flat) both live in the same habitat / area / named area	allow habitats overlap the most	1
5(b)(iii)	any **two** from: • would have wrong food • would otherwise be exposed to (specific) predators • cannot tolerate extended exposure to air **or** reduced submersion in seawater • cannot tolerate high salt concentration (in rock pools) • cannot compete with small periwinkle	allow cannot tolerate temperature / dehydration allow low salt concentration (in rock pools)	2
Total			**5**

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)	gets more light (near surface) (so) photosynthesises more (because) bladders aid floating (when tide is in) **or** (so) more biomass / glucose / starch produced	allow warmer (near surface) allow bladders contain (more) carbon dioxide ref to 'more' needed only once, eg gets more light for photosynthesis gains **two** marks if 'more' not given do not award mark on the first occasion	1 1 1	AO2 / AO3 1.4.1a/b/d
5(b)	lets angler fish see /attract its prey / mates **or** see predators as it is dark (at 1000m) **or** lets angler fish see / attract prey to get food **or** lets angler fish see / attract mates to reproduce **or** lets angler fish see predators to avoid being eaten	must be in a correct pair to gain **two** marks	2	AO2 1.4.1a/c/d/ f/g
Total			**5**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)(i)	have (most branched) roots near surface **or** roots at 0 – 1 m **and** long / deep roots **or** roots below 6 m		1	AO2/3 1.4.1b
	(roots near surface) absorb (recent) rain / dew	allow (roots near the surface) absorbs water quickly or before it evaporates	1	
	(long roots) absorb water from deep underground or underground streams		1	
		if neither mark points 2 or 3 are awarded allow **1** mark for idea of increased anchorage		
5(a)(ii)	reduced / less /small surface area	ignore surface area : volume	1	AO2
	reduces water loss / evaporation	allow reduces transpiration	1	1.4.1f
5(b)	deter herbivores	allow deter animals from eating / damaging them	1	AO2 1.4.1g
5(c)(i)	any **one** from: • energy (storage) • insulation • idea of metabolic water	allow idea of (physical) protection	1	AO2 1.1.1a 1.4.1d/f

5(c)(ii)	**either** *camel / fat in hump:* reduced insulation (on most of body) so more (thermal) energy released **or** *llama / (layer) under the skin:* increased insulation (all over) (1) to reduce (thermal) energy loss (1)	 allow more 'heat' released **or** allow insulates upper surface (1) to reduce heat gain (1) **or** allow more insulation in cold night (1) when camel is sitting / lying (1) allow to reduce 'heat' loss	 1 1	AO2/3 1.4.1d/e/f
Total			**9**	

Question	Answers	Extra information	Mark	AO / spec ref.
2	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.		6	AO1 1.4.1d,f

0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)
No relevant content.	At least **one** way in which animals **and / or** plants are adapted to survive.	A description of ways in which animals **and / or** plants are adapted **and** an attempt to link at least **one** adaptation to how it increases the chance of survival.	A description of ways in which animals **and** plants are adapted **and** a description of how at least **one** adaptation increases the chance of survival.

examples of biology points made in the response:

(animals)
- (A) change / decrease in surface area / example
  - (decrease in surface area which) reduces area from which sweat / water may be lost
- (A) hump with fat / fat stores
  - (fat in hump) to convert to water (via respiration)
- (A) long eyelashes
  - (long eyelashes) to keep (wind-blown) dust out of eyes
- (A) nocturnal / 'keep out of the sun'
  - reduce sweat loss (in heat of the day)

(plants)
- (A) decrease in surface area
- (A) leaves are spikes
  - (reduced area / leaves are spikes) reduces water loss / transpiration / evaporation
- (A) long / wide spread / extensive roots
  - (long / wide spread /extensive roots) to absorb (more) water
- (A) fleshy / thick stem
  - (fleshy / thick stem) to store water

extra information

allow adaptations of specific animals to living in specified dry conditions, eg a desert
- (A) change / increase in surface area / example
  - (increase in surface area which) increases area heat may be lost from (by radiation)
- (A) changes to thickness of insulating coat
  - (thicker coat on upper surface) increases insulation from sun's heat
- (A) thin (layer) / reduced amount of body fat
  - (reduced amount of body fat which) reduces insulating layer
- (A) wide feet
  - (wide feet) to reduce pressure / spread weight / prevent sinking

allow adaptations of specific plants to living in specified dry conditions, eg a desert
- (A) thick wax
  - (thick wax) to reduce evaporation / water loss / transpiration
- (A) few(er) stomata
  - (few stomata) to reduce evaporation / water loss / transpiration

Total			6

BL2HP

Question 3

question	answers	extra information	mark
3(a)(i)	(white) clover		1
3(a)(ii)	reed sweet-grass	allow reed allow grass	1
3(a)(iii)	(only) found in swamp and aquatic zones **or** only found in water **or** doesn't grow in marsh	ignore wet conditions	1

3(b) — 6 marks

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0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)
No relevant content.	There is a basic description which describes how a quadrat **or** a metre tape could be used to collect data	There is a clear description of how a quadrat **and** a metre tape could be used to collect data along a line	There is a clear, logical and detailed description of a method that will produce valid, repeatable results across / at intervals along the stream.

examples of procedural points made in the response:

- use of tape measure to produce transect
- placing of quadrats
- transect placed across stream
- score presence of each plant species
- use quadrat at regular intervals along tape
- repeat transect several times (≥ 3)
- along stream
- at random **or** regular intervals

Total			9

BL2HP

Question 5

question	answers	extra information	mark
5(a)	use of quadrat / point frame randomly placed / random sampling	allow description ignore reference to transects	1 1
5(b)(i)	6		1
5(b)(ii)	more light in A / in field / where sunny more / better / faster photosynthesis in A / with more light	ignore sun allow converse	1 1
5(b)(iii)	use light meter / measure light intensity in both habitats take many measurements at same time of the day **or** laboratory / field investigation with 2 batches high light and low light (1) count or number of flowers in each (1)	 counting point is dependent on investigation point	1 1
5(c)	more glucose / energy available for growth	allow other named product eg protein allow if more energy produced dependent on 1st mark	1 1
Total			**9**

Question 2

question	answers	extra information	mark
2(a)	chose places randomly method of obtaining randomness, e.g. (grid and) random numbers	 allow thrown qualified e.g. over shoulder, eyes shut allow max 1 for mention of a transect with sampling at regular or random intervals	1 1
2(b)(i)	7 or 8	allow fractions / decimals between 7 and 8	1
2(b)(ii)	count number of whole squares and add estimate of area covered by part squares	allow reference to counting squares with ½ cover or more allow clear working on diagram and / or (b)(i)	1
2(b)(iii)	28 – 32 (in range)	allow ecf if answer incorrect allow **1** mark for reasonable reference to divided by 25 or multiplied by 4	2
2(c)	nutrients / minerals / ions / fertiliser / water	allow light / pH / trampling / soil texture / grazing / mowing / weed killer / where seeds originally fell ignore pollution / soil / competition if unqualified ignore temperature / wind	1
Total			**7**

Question	Answers	Extra information	Mark	AO / spec ref.
5(a)(i)	to get data re position of seaweed / of organism in relation to distance from sea / distance down shore / how long each seaweed was exposed		1 1	AO2 2.4.1b
5(a)(ii)	repeat several times elsewhere along the shore	minimum = 2 repeats	1 1	AO3 2.4
5(a)(iii)	bladder wrack is further up the shore (than the sea lettuce) / exposed for longer sea lettuce (only) in rock pools / in the sea / (only) in water	ignore found in dry areas / on bare rock	1 1	AO3 2.4.1a,b
5(b)	gets more light / closer to light (so) more photosynthesis	allow better access to CO_2 allow 1 mark for light for photosynthesis allow 1 mark for CO_2 for photosynthesis ignore reference to oxygen for respiration 'more' only needed once for 2 marks	1 1	AO1 / AO2 2.4.1a, 2.3.1c
Total			8	

Question	Answers	Extra information	Mark	AO / Spec. Ref
2			6	AO1 / AO2 / AO3 2.4, 2.4.1a,b,prac

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0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content.	The apparatus needed to measure the leaf is identified **or** the apparatus needed to measure light intensity is identified **or** an appropriate use of the tape measure is identified.	There is a description of a leaf being measured at different locations **or** light being measured at different locations.	There is a description of a leaf **and** light being measured at different locations **and** repetitions are included **or** a control variable is described **or** appropriate mathematical treatment of the data is described

examples of points made in the response:

- use of tape measure to produce transect
- transect placed coming out of shady area (eg woodland) into lighter area
- repeat transects
- samples at same height above ground
- samples at same aspect (N / E / S / W) on trees
- measurement of length, or width, of leaves using ruler
- measure several leaves at each location
- use of light meter to measure light intensity
- repeat measurements of light intensity on several days
- measure light intensities at same time of day
- calculate mean for each location
- plot graph of mean leaf length, or width, vs. light intensity

extra information

allow attempt to overcome other variables – eg soil water / soil pH / temperature

Total		6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)	160 000	if incorrect answer / no answer: allow max. 2 for method: 1 mark for mean = total number ÷ area of ten quadrats eg $\frac{20}{0.625}$ or $\frac{20 \times 8}{5}$ or $\frac{160}{5}$ or 32 1 mark for final answer = mean x field area eg mean x 5000	3	AO2 2.4.1b
7(b)	Improvement: place quadrats randomly **and** Reason: avoid bias / (more) representative / (more) reliable Improvement: more quadrats **and** Reason: overcome random variation / (more) typical / (more) representative / (more) reliable / repeatable Improvement: larger quadrats **or** repeat when plants are bigger **and** Reason: less likely to miss plants	allow 1 mark if 2 correct improvements but no reasons / only incorrect reasons ignore accurate ,valid, precise and fair ignore anomalies	1 1 1	AO3 2.4, 2.4.1b
Total			**6**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2			6	AO1/2/3 2.4 2.4.1a/b Prac

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content.	A simple correct statement is made about the investigation, e.g. counting plants in a quadrat **or** measuring pH **or** random placement of a quadrat.	There is a description of how a quadrat could be used to collect data at different locations. **or** how a pH meter could be used to collect data at different locations. **For four marks** an additional point is made e.g. reference to randomness **or** compare to other's results.	There is a description of how a quadrat **and** pH meter could be used to collect data at different locations. **For full marks** an additional point to ensure validity is made e.g. repeat in a different marshland **or** randomness **or** measure pH at the same depth each time **or** large number of repeats **or** graph or correlate results.

examples of points made in the response:	extra information
• placing of quadrat and measuring plants	
• randomly in area where plant is growing • randomly in area where plant is not growing	allow • regular intervals along a transect • from an area where plants are growing to an area where plants are not growing
• many times • score number **or** % cover **or** dry mass or heights of plants per quadrat • measure soil pH in each quadrat • control variables such as measurements at same depth • repetition of pH measurements in a quadrat • calculate mean pH for each quadrat • relate quantity of plants to soil pH – e.g. graph	allow presence / absence

Total		6